

Materials Genome Initiative (MGI)

Completed Technology Project (2012 - 2016)



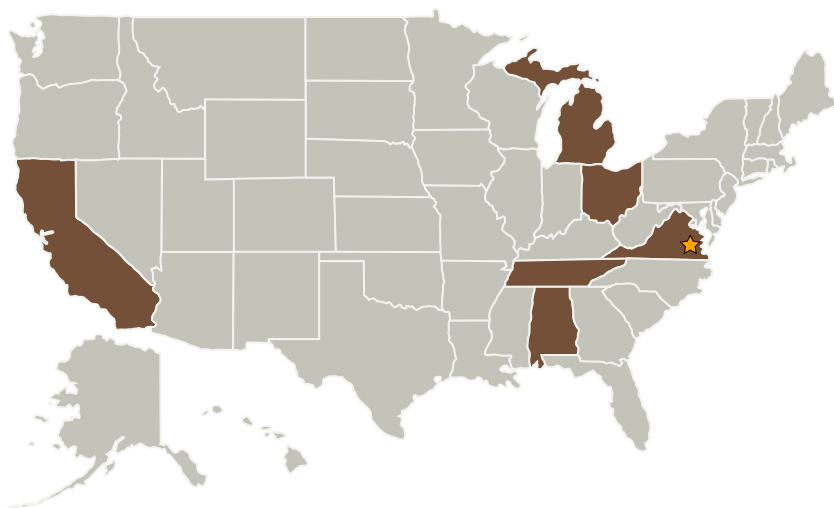
Project Introduction

Develop computational tools to assist in the manufacture, design and certification of new materials and processes. These tools will reduce the time and costs to infuse new materials while also improving reliability. This program is currently focusing on additive manufacturing as this technology has high payoff for NASA and requires computational design tools.

Anticipated Benefits

NASA funded: Computational materials tools will be developed in close collaboration with existing projects in STMD, GCD, and ARMD. These tools will be infused directly to improve manufacturing and insure accelerated insertion of new materials. For the SLS project, computational tools will focus on reducing manufacturing variability, and part certification to reduce cost and time to infuse new parts. **NASA unfunded:** Development of computational tools for additive manufacturing (AM) will reduce cost and time for both manufacturing and certification of new parts, reducing cost and risk of future missions. **OGA:** Development of computational tools for additive manufacturing (AM) will reduce cost and time for both manufacturing and certification of new parts, reducing cost and risk of future missions. **Commercial:** The Commercial Space Industry can utilize computational tools to guide development of additive manufacturing (AM) parameters, decreasing the time and cost while increasing the quality of components and structures. **Nation:** Development of AM computational tools will lower the risk to US industries of exploiting new AM processes.

Primary U.S. Work Locations and Key Partners



Materials Genome Initiative

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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Game Changing Development

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Organizations Performing Work	Role	Type	Location
★ Langley Research Center (LaRC)	Lead Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Alabama	California
Michigan	Ohio
Tennessee	Virginia

Project Transitions

▶ **October 2012:** Project Start

✓ **September 2016:** Closed out

Closeout Summary: The objectives of this project element were to apply computational methods in conjunction with experimental characterization and processing studies to gain a better understanding of manufacturing processes and materials behavior to accelerate process development and certification to more efficiently integrate new materials into existing and future NASA missions and lead to the design of new materials for improved performance. Specifically, the MGI project element focused on applying this approach to the Selective Laser Manufacturing of engine components for the Space Launch System and also sought to leverage investments and activities of other Federal agencies participating in the Materials Genome Initiative. This project developed and experimentally validated thermal models of SLM manufactured components to predict residual stresses and distortion and developed a process control tool for SLM fabrication of engine components and delivered it to the SLS Program. Computational tools developed under the MGI Project Element will also be transitioned into the GCD Rapid Analysis and Manufacturing Propulsion Technology (RAMPT) Project for further development.

Project Website:

<https://www.nasa.gov/directorates/spacetech/home/index.html>

Project Management

Program Director:

Mary J Werkheiser

Program Manager:

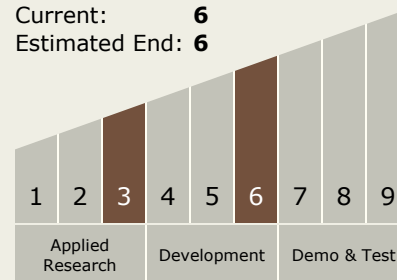
Gary F Meyering

Principal Investigator:

John H Vickers

Technology Maturity (TRL)

Start: 3
Current: 6
Estimated End: 6



Target Destination

Foundational Knowledge